

J. J. Zanazzi

THEORETICAL ASTROPHYSICIST · PHD · U.S. CITIZEN · CURRICULUM VITAE

Department of Astronomy, 501 Campbell Hall #3411, University of California, Berkeley, CA 94720-3411, USA

✉ jzanazzi@berkeley.edu | 🏠 jjzanazzi.com | +1(341)766-4531

Education

Cornell University, Dept. of Astronomy

PHD IN THEORETICAL ASTROPHYSICS, ADVISOR PROF. DONG LAI

Ithaca, NY, USA

Sept. 2013 - Aug. 2018

Northern Arizona University (NAU)

MERGED B.S. IN PHYSICS & ASTRONOMY

B.S. IN MATHEMATICS

Flagstaff, AZ, USA

Sept. 2009 - May 2013

Semester-Long Mathematics Programs

MATH IN MOSCOW PROGRAM, INDEPENDENT UNIV. OF MOSCOW, MOSCOW, RU

MATHEMATICS ADVANCED STUDY SEMESTERS (MASS), PENN. STATE UNIV., STATE COLLEGE, PA, USA

Jan. 2013-May 2013

Sept. 2011-Dec. 2011

Positions

Dept. of Astronomy, Univ. of California (UC) Berkeley

51 PEGASI B POSTDOCTORAL FELLOW

Berkeley, CA, USA

Sept. 2022-Present

Canadian Institute for Theoretical Astrophysics (CITA), Univ. of Toronto

RESEARCH ASSOCIATE

POSTDOCTORAL FELLOW

Toronto, ON, CA

Sept. 2021 - Aug. 2022

Sept. 2018 - Aug. 2021

Dept. of Applied Mathematics and Theoretical Physics (DAMTP), Univ. of Cambridge

DAVID CRIGHTON VISITING POSTDOCTORAL FELLOW

Cambridge, UK

Sept. 2019 - Nov. 2019

Dept. of Astronomy, Cornell Univ.

GRADUATE RESEARCH ASSISTANT

Ithaca, NY, USA

Sept. 2015 - Aug. 2018

Research Highlights

- Successful prediction of polar-aligned protoplanetary disks (Zanazzi & Lai 2018a; Kennedy et al. 2019, NatAs; Czekala et al. 2019)
- Prediction of primordial spin-orbit misalignment suppression for short-period planets with binary companions (Zanazzi & Lai 2018c; Montet et al. 2020; Hjorth et al. 2021, PNAS)
- Stellar binaries show signatures of circularization of resonance locking during the pre-main sequence (Zanazzi & Wu 2021; Zanazzi 2022)
- Precessing magnetars explain periodic fast radio bursts (Zanazzi & Lai 2020, ApJL; Li & Zanazzi 2021, ApJL; Zhang 2020, Nature)

Honors & Awards

POSTGRADUATE

- | | | |
|------|---|--------------------|
| 2022 | 51 Pegasi b Postdoctoral Fellowship , Prize fellowship to fund research at UC Berkeley | Heising-Simons Fdn |
| 2019 | David Crighton Fellowship , 2-3 month postgraduate grant to work at DAMTP | Univ. of Cambridge |
| 2017 | Eleanor York Prize , Recognition for academic achievement and service | Cornell Univ. |
| 2015 | Earth and Space Science Graduate Fellowship , Funded 3 years of graduate research at Cornell | NASA |

UNDERGRADUATE (NATIONAL)

- | | | |
|------|---|----------------|
| 2013 | Math in Moscow Scholarship , Funded study-abroad semester at Ind. Univ. of Moscow | AMS/NSF |
| 2012 | Honorable Mention , New Frontiers in Astronomy and Cosmology Student Essay Competition | Templeton Fdn. |
| 2011 | MASS Fellowship , Funded Mathematics Advanced Study Semesters (MASS) program | Penn State/NSF |
| 2009 | NAU/NASA Space Grant , Funded undergraduate exoplanetary research | AZ Space Grant |

UNDERGRADUATE (INSTITUTIONAL)

- | | | |
|------------|---|-----|
| 2012 | Arthur and Catherine B. Adel Scholarship Fund , Scholarship from Physics and Astronomy Dept. | NAU |
| 2012 | Karen and Terrence Hall Scholarship , Scholarship from Mathematics and Statistics Dept. | NAU |
| 2010, 2011 | Chair's Scholar , Small Scholarship from Physics and Astronomy Dept. | NAU |
| 2010 | Alumni Scholarship , Scholarship from NAU Alumni Association | NAU |

PODCAST INTERVIEWS

Earth News Interviews, *Protoplanetary Disks and Backwards-Spinning Stars*, Univ. of Toronto

Apr. 4, 2021

ARTICLES

***Tsinghua University**, *Rare binary star systems discovered: Study*

July 18, 2022

UofT News, *International team of astronomers discovers two rare binary star systems*, Chris Sasaki

July 11, 2022

astrobites, *A Star Askew: A Potential Cause of the Misalignment of a Star and its Planets*, Ali Crisp

Apr. 13, 2021

***Aarhus Univ.**, *A backward-spinning star with two coplanar orbiting planets in a multi stellar system*, Ole Knudsen

Feb. 25, 2021

New Scientist, *We have spotted two planets orbiting a backwards-spinning star*, Krista Charles

Feb. 15, 2021

***Subaru Telescope**, *Flipped-Over Exoplanets Prove New Disk-Tilt Mechanism*

Feb. 15, 2021

***Telescopio Nazionale Galileo**, *Two backward orbiting exoplanets in a triple star system prove protoplanetary disk-tilt mechanism*

Feb. 15, 2021

***CITA**, *Planetary system with a star that rotates backwards*

Feb. 15, 2021

AAS Nova, *An Update on the Mysterious Flashes of FRB 180916*, Susanna Kohler

July 8, 2020

Nature, *Unexpected emission pattern adds to the enigma of fast radio bursts*, Bing Zhang

June 17, 2020

Inside Science, *How Plate Tectonics Could Make Rocky Planets Hospitable to Life*, Ramin Skibba

Feb. 27, 2019

MEDIA COMMENTARY

AGU Eos, *Peculiar Planets Prefer Perpendicular Paths*, Kimberly Cartier

July 29, 2021

Publications

Legend: *undergraduate student, †graduate student, **my name**

LEAD-AUTHOR

1. **J. J. Zanazzi**. A Tale of Two Circularization Periods, 2022, ApJL, 929, L27
2. **J. J. Zanazzi** & Y. Wu. Tidal Circularization of Binaries by Resonance Locking I: The Importance of the Pre-Main Sequence, 2021, AJ, 161, 263.
3. **J. J. Zanazzi** & G. Ogilvie. Eccentric Tidal Disruption Event Disks around Supermassive Black Holes: Dynamics and Thermal Emission, 2020, MNRAS, 499, 556
4. **J. J. Zanazzi** & D. Lai. Periodic Fast Radio Bursts with Neutron Star Free Precession, 2020, ApJL, 892, L15
5. **J. J. Zanazzi** & D. Lai. Tidal Disruption Event Disks around Supermassive Black Holes: Disk Warp and Inclination Evolution, 2019, MNRAS, 487, 4965
6. **J. J. Zanazzi** & A. Triaud. The Ability of Significant Tidal Stress to Initiate Plate Tectonics, 2019, Icarus, 325, 55
7. **J. J. Zanazzi** & D. Lai. Planet Formation in Disks with Inclined Binary Companions: Can Primordial Spin-Orbit Misalignment be Produced?, 2018c, MNRAS, 478, 835-851
8. **J. J. Zanazzi** & D. Lai. Effect of Disk Warp in Star-Disk-Binary Systems, 2018b, MNRAS, 477, 5207-5219
9. **J. J. Zanazzi** & D. Lai. Inclination Evolution of Protoplanetary Disks Around Eccentric Binaries, 2018a, MNRAS, 473, 603-615
10. **J. J. Zanazzi** & D. Lai. Extended Transiting Discs and Rings Around Planets and Brown Dwarfs: Theoretical Constraints, 2017, MNRAS, 464, 3945
11. **J. J. Zanazzi** & D. Lai. Triaxial Deformation and Asynchronous Rotation of Rocky Planets in the Habitable Zone of Low-Mass Stars, 2017, MNRAS, 469, 2879-2885
12. **J. J. Zanazzi** & D. Lai. Lidov-Kozai Mechanism in Hydrodynamical Disks: Linear Stability Analysis, 2017, MNRAS, 467, 1957
13. **J. J. Zanazzi** & D. Lai. Electromagnetic Torques, Precession and Evolution of Magnetic Inclination of Pulsars, 2015, MNRAS, 451, 695
14. **John Zanazzi**. A short proof of Klee's theorem. *Discrete Mathematics*, **314** (2014), pp. 14-16.

STUDENT LEAD-AUTHOR

1. *Michael Poon, **J. J. Zanazzi** & Simon Albrecht. Constraining the Efficiency of Inertial Wave Tidal Dissipation using the Stellar Obliquities of Hot Jupiter Systems, in prep
2. †Dongzi Li & **J. J. Zanazzi**. Emission Properties of Periodic Fast Radio Bursts from the Motion of Magnetars: Testing Dynamical Models, 2021, ApJL, 909, L25
3. *Michael Poon, **J. J. Zanazzi** & W. Zhu. Constraining the Circumbinary Disk Tilt in the KH 15D system, 2021, MNRAS, 503, 1599
4. *Jessica Speedie & **J. J. Zanazzi**. The Stability of Extended Circumplanetary Disk and Ring Systems, with Application to J1407b, 2020, MNRAS, 497, 1870

CONTRIBUTED

1. Zhu W., Bernhard K., Dai F., Fang M., **Zanazzi J. J.**, Zang W., Dong S., et al., Two Candidate KH 15D-like Systems from the Zwicky Transient Facility, 2022, ApJL, 933, L21.
2. Cornelis Dullemond, Carolin Kimmig, & **J. J. Zanazzi**. On the equations of warped disc dynamics, 2022, MNRAS, 511, 2925
3. Wang J. J., Ruffio J.-B., Morris E., Delorme J.-R., Jovanovic N., Pezzato J., Echeverri D., Finnerty L., Hood C., **Zanazzi J. J.**, et al. Detection and Bulk Properties of the HR 8799 Planets with High-resolution Spectroscopy, 2021, AJ, 162, 148
4. Hjorth, Albrecht, Hirano, Winn, Dawson, **Zanazzi**, Knudstrup, & Sato. A backward-spinning star with two coplanar planets, 2021, PNAS, 118, 2017418118

Oral Presentations

*Virtual (via Zoom)

INVITED

California Institute of Technology , Theoretical Astrophysics and Relativity Seminar	May 26, 2023
*Chalmers University , Astrophysics Colloquium	Feb. 15, 2023
Univ. of Florida , Astrophysics Seminar	Feb. 7, 2023
Univ. of Florida , Physics Colloquium	Feb. 6, 2023
Heising-Simons Fdn , 51 Pegasi b Science Summit	Aug. 17, 2022
Niels Bohr Institute , Prof. Martin Pessah Group Meeting	June 13, 2022
Niels Bohr International Academy , Mini TDE Workshop	June 8, 2022
*Northwestern University , CIERA Science Happy Hour	Jan. 14, 2022
*University of California Berkeley , Center for Integrative Planetary Science Seminar	Sept. 29, 2021
*University of Victoria , Canada Planet Discussion Day Conference	June 10, 2021
*Cornell University , Theoretical Astrophysics Seminar	Apr. 6, 2021
*Heidelberg University , Prof. Kees Dullemond Group Meeting	Apr. 1, 2021
*Harvard University , Prof. Ramesh Narayan Group Meeting	Feb. 24, 2021
*KU Leuven , Institute for Astronomy Seminar	Feb. 19, 2021
*Princeton University , Prof. Josh Winn Group Meeting	Nov. 23, 2020
*University of Cambridge , X-ray Astronomy Group Meeting	May 19, 2020
University of California Berkeley , Theoretical Astrophysics Center Seminar	Dec. 2, 2019
Aarhus University , Stellar Astrophysics Center Seminar	Nov. 6, 2019
University of Warwick , Astronomy Seminar	Oct. 23, 2019
University of Cambridge , DAMTP Astrophysical Fluid Dynamics Seminar	Oct. 14, 2019
Tsung-Dao Lee Institute , Astrophysical Dynamics Conference	July 8, 2019
Shanghai, China , Exoplanets and Planet Formation Conference	Dec. 12, 2018

CONTRIBUTED

University of Toronto , Toronto Astrophysics Talks, Y'all (TASTY)	Feb. 14, 2023
American Astronomical Society Winter Meeting , Seattle, WA, USA	Jan. 12, 2023
Niels Bohr International Academy , Workshop on Radiative Transfer	June 9, 2022
*Canadian Institute for Theoretical Astrophysics , CITA Seminar	Sept. 23, 2021
*California Institute of Technology , Prof. Jim Fuller Group Meeting	June 03, 2021
*Division of Dynamical Astronomy (DDA) , DDA Annual Meeting	May 18, 2021
*University of Cambridge , Distorted Astrophysical Disks: Insights and Future Directions Conference	May 17, 2021
*Canadian Institute for Theoretical Astrophysics , CITA Seminar	June 8, 2020
Kyoto University , Tidal Disruption Events: General Relativistic Transients Workshop	Jan. 21, 2020
Kyoto University , Tidal Disruptions in Kyoto: Confronting Theory with Observations Conference	Jan. 14, 2020
Center for Computational Astrophysics , Compact Objects Group Meeting	Sept. 19, 2019
Max Plank Institute Heidelberg , Planetary Dynamics Conference	June 4, 2019
Center for Computational Astrophysics , Planet Formation Workshop	May 23, 2019
American Astronomical Society Winter Meeting , Seattle, WA, USA	Jan. 8, 2019
California Institute of Technology , Yuk Lunch Seminar	Feb. 21, 2018
University of California Santa Cruz , Other Worlds Laboratory Seminar	June 28, 2017
Yale University , Emerging Researchers in Exoplanet Science III Conference	June 12, 2017
Paris Observatory , Dynamics Seminar	May 23, 2017
University of Cambridge , Exoplanetary Meetings	May 18, 2017
Aspen Center for Physics , Formation and Dynamical Evolution of Exoplanetary Systems Winter Conference	Mar. 30, 2017
Cornell University , Emerging Researchers in Exoplanet Science II Conference	June 14, 2016
Joint Mathematics Meetings , Annual Joint Mathematics Meeting, San Diego, CA, USA	Jan. 12, 2012/193
Northern Arizona University , Algebra, Combinatorics, Geometry, and Topology Seminar	Sept. 25, 2012

Advising Experience

SCIENTIFIC

ULab Research Project Review Panel

POSTDOC PROJECT REVIEWER

- Provided feedback on two undergraduate-led research projects per semester

UC Berkeley
Sept. 2022-Nov. 2022

Saahit Morgan, ULab Undergraduate Researcher

LEAD ADVISOR

- Project: Observational Biases of Circumbinary Planet Detection, *in progress*

UC Berkeley
Sept. 2022-PRESENT

Feiyu Quan, CITA SURP Fellow

TERTIARY ADVISOR WITH NEIGE FRANKEL AND JOSH SPEAGLE

- Project: Characterizing Warps in Galactic Disks, *in progress*

UC Berkeley
Aug. 2022-Oct. 2022

Kanah Smith, CITA SURP Aurora Borealis Fellow

LEAD CO-ADVISOR WITH DR. JANOSZ DEWBERRY

- Project: The effect of tidal dissipation on circumbinary planet stability, *in progress*

Univ. of Toronto
May 2021-PRESENT

Niharika Namulla, CITA SURP Fellow

LEAD CO-ADVISOR WITH DR. JANOSZ DEWBERRY

- Project: Using survival analysis to study the stability of circumbinary planets, *in progress*

Univ. of Toronto
May 2021-PRESENT

Dongzi Li, CITA Graduate Student

COLLABORATOR, PHD ADVISOR PROF. UE-LI PEN

- Project: Polarization of FRBs from precessing magnetars, *student lead-author publ. in ApJL*

Univ. of Toronto
May 2020-Feb. 2021

Michael Poon, CPS, SURP, and McGill Undergraduate Research Fellow

LEAD CO-ADVISOR WITH WEI ZHU (P1), SIMON ALBRECHT (P2), AND EVE LEE (P3)

- Project 3: Planetary obliquities in the HR 8799 planetary system
- Project 2: Constraining inertial wave dissipation using stellar obliquities of hot Jupiter host stars, *student lead-author publ. in-prep*
- Project 1: Constraining the circumbinary disk tilt in the KH 15D system, *student lead-author publ. in MNRAS*

Univ. of Toronto
June 2019-Oct. 2021

Jessica Speedie, NSERC USRA SURP Fellow

LEAD ADVISOR

- Project: The structure and stability of inclined, circumplanetary disk or ring systems, *lead-author publ. in MNRAS*

Univ. of Toronto
May 2019-Sept. 2019

PROFESSIONAL

Dunlap Institute Postdoc-Student Mentorship program

PROFESSIONAL ADVISE TO UNIV. OF TORONTO ASTRONOMY GRADUATE STUDENTS

- Students: Adaeze Ibik, Jennifer Scora, Taylor Kutra

Toronto, CA
May 2020-current

Girls SySTEM Mentorship program

PROFESSIONAL ADVISE FOR FEMALE HIGH-SCHOOL STUDENTS INTERESTED IN A STEM CAREER, IN THE GREATER TORONTO AREA

- Students: Bernadette Tolentino

Toronto, CA
May 2020-June 2020

Teaching Experience

TEACHING ASSISTANT

“The History of the Universe,” Writing in the Disciplines Course (Astro 2201)

TEACHING ASSISTANT

TEACHING ASSISTANT

Duties: Give guest lectures, assist in design of essay prompts, grade essays written by students.

Cornell Univ.
Spring 2015
Fall 2013

“The History of the Universe” (Astro 1101)

TEACHING ASSISTANT

Duties: Give weekly break-out session lectures to two groups of ~10 students, grade problem sets

Cornell Univ.
Fall 2014

“Relativity and Astrophysics” Massively on-line open course (Astro 2290x)

TEACHING ASSISTANT

Duties: assist designing on-line problem sets, answer questions of $\gtrsim 10,000$ students on course chat boards

Cornell Univ.
Spring 2014

UNDERGRADUATE WORKSHOPS

“How to Write an Abstract”, SURP Professional Development Workshop Series

INSTRUCTOR & ORGANIZER

INSTRUCTOR & ORGANIZER

Hands-on workshop, which included asking undergrad research students to write an abstract on their current projects.

Univ. of Toronto
July 23, 2019
June 16, 2020

Workshop on Gravitation and Pulsars

ASSISTANT INSTRUCTOR

Assisted running a workshop teaching pulsar timing data-analysis techniques to undergraduate researchers.

Cornell Univ.
July 19, 2016

Physics GRE Workshop

INSTRUCTOR & ORGANIZER

Organized and lead workshop on test preparation for Physics GRE, aimed at visiting Undergraduate Research Assistants.

Cornell Univ.
June 30, 2016

GUEST LECTURES

Guest Lecturer, Astro 101 SURP Lecture Series

LECTURE: *Orbital Dynamics and Tidal Evolution in Stellar and Planetary/Exoplanetary Systems*

LECTURE: *Orbital Dynamics and Tidal Evolution in Stellar and Planetary/Exoplanetary Systems*

Univ. of Toronto

June 3, 2020

June 1, 2019

Guest Lecturer, Introduction to Astrophysics (AST 320)

LECTURE: *How to Build a Star/Planet*

Univ. of Toronto

Dec. 13, 2019

CITA Blackboard Talks

LECTURE: *The Structure and Dynamics of Warped Accretion Disks*

LECTURE: *How Dust Scattering can hide Mass in ALMA Protoplanetary Disks*

LECTURE: *Optical Emission from Tidal Disruption Events of Stars around Supermassive Black Holes*

LECTURE: *Magnetic Interactions between Protoplanetary Disks and their Spinning Host Stars*

Univ. of Toronto

Oct. 16, 2018

Apr. 30, 2019

Nov. 19, 2019

Mar. 31, 2020

TUTORING

Academic Success Center

PHYSICS & MATHEMATICS UNDERGRADUATE TUTOR

Duties: One-on-one tutoring of undergraduate students for Physics and Mathematics courses. Worked 10 hours/week.

Northern Arizona Univ.

Oct. 2010-Mar. 2011

Observing Proposals

CO-INVESTIGATOR

ESO DDT Proposal

PI PROF. SIMON ALBRECHT, OBTAINED 6.3 HOURS ON EXPRESSO

June 9, 2019

- Title: *A multi-transiting planet system with a retrograde orbiting planet: testing coplanarity and primordial disk misalignment*

Service

Seminar Committee, UC Berkeley Center for Integrative Planetary Science

Fall 2022-Present

Lead Conference Organizer, CITA Planet Day

Aug. 9-10, 2022

Astronomy Anti-Racism Committee, University of Toronto

Fall 2021-Fall 2022

Conference Co-organizer, Canada Planet Discussion Day

Summer 2021

Summer Undergraduate Research Program (SURP) Committee, University of Toronto

Summer 2020

Blackboard Talk Committee, Canadian Institute for Theoretical Astrophysics

Fall 2019-Fall 2022

Panel Reviewer, NSF Astronomy & Astrophysics Program

Panel Reviewer, NASA Exoplanets Research Program

Panel Reviewer, NASA Theoretical Astrophysics Program

External Reviewer, UKRI STFC DiRAC HPC Proposal

Executive Secretary, NASA Exoplanetary Formation and Dynamics Program

SURP Poster Judge, University of Toronto

Summer 2019- Summer 2021

Colloquium Representative, Astronomy Graduate Network, Cornell University

Spring 2018

Referee, MNRAS, ApJL, ApJ, A&A, PSJ

Outreach

Fayetteville Free Library Geek Girl Camp

Cornell Univ.

ACTIVITY COORDINATOR: NASA'S EDIBLE ROCKS

July 2018

Lead activity teaching meteor classification to middle school science camp for girls.

Fuertes Observatory Solar Eclipse Viewing

Cornell Univ.

ACTIVITY ASSISTANT: ECLIPSE VIEWING

July 2018

Handed out glasses and set up telescopes to safely view the great American eclipse for a few thousand visitors.

4-H Focus for Teens Career Explorations

Cornell Univ.

ACTIVITY ORGANIZER: SUPERNOVAE WORKSHOP

June 2014-June 2016

Lead workshop on supernovae and nucleosynthesis for sixth grade students (once per year).

Southside Community Center

Ithaca, NY

OUTREACH VISIT, ASSISTANT ROLE

Sept. 2014

Afternoon visit, doing astronomy-themed educational activities for underprivileged elementary school children.

Career Day

Cornell Univ.

POPULAR ASTRONOMY LECTURE

June 2014-June 2015

Gave talk about neutron stars to visiting sixth grade students (once per year).

Museum in the Dark, Museum of the Earth

SPANDEX-UNIVERSE DEMO COORDINATOR

Manned “The Spandex Universe” demo, explaining relativity to the general public (once per year).

Ithaca, NY
Oct. 2013-Oct. 2015

Science Communication Training

ComSciCon-Cornell

WORKSHOP PARTICIPANT

Participated in week-long science communication workshop for graduate students and post-docs

Cornell Univ.
May 21-29 2015

References

Eugene Chiang

PROFESSOR, DEPT. OF ASTRONOMY AND EARTH & PLANETARY SCIENCE, UNIV. OF CALIFORNIA BERKELEY

Address: Astronomy Department, 501 Campbell Hall #3411, Berkeley CA 94720-3411

Phone: (510)701-5996

Email: echiang@astro.berkeley.edu

Norman Murray

PROFESSOR, CANADIAN INSTITUTE FOR THEORETICAL ASTROPHYSICS, UNIV. OF TORONTO

Address: McLennan Physical Laboratories, Room 1404D, 60 St. George Street, Toronto Ontario M5S 3H8

Phone: 416-978-1778

Email: murray@cita.utoronto.ca

Dong Lai

BENSON JAY AND MARY ELLEN SIMON PROFESSOR, DEPT. OF ASTRONOMY, CORNELL UNIV.

Address: 618 Space Sciences Building, Cornell University, Ithaca, NY 14853

Phone: 607-255-4936

Email: dong@astro.cornell.edu

Gordon Ogilvie

PROFESSOR, DEPT. OF APPLIED MATHEMATICS AND THEORETICAL PHYSICS, UNIV. OF CAMBRIDGE

Address: Centre for Mathematical Sciences, Wilberforce Road, Cambridge CB3 0WA, United Kingdom

Phone: +44-(0)1223-760395

Email: gjo10@cam.ac.uk